GOES-R Notional End-To-End Architectures

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Outline

- Mission goals
- Candidate instruments
- Instrument Formulation
- Architecture studies purpose / approach
- Possible configurations
- Top level Schedule

GOES-R Series Mission Goals

- Develop and deploy a reliable operational system that provides continuous observations of the environment and severe storms to protect life and property
- Monitor solar activity and space environmental conditions
- Introduce improved atmospheric and oceanic observations and data dissemination capabilities
- Develop and provide new and improved applications and products for a wide range of federal agencies, state and local governments, and private users

GOES R Mission begins with the User

- User requirements are demanding and exciting
  - New data types and observing strategies
  - More frequent updates
  - Larger and more complex instruments
- GOES R-Series is part of an integrated “system of systems” with NPOESS and other data sources
- Data will be used in ways we haven’t thought of yet

Instrument Formulation

- Allocate user requirements to instrument/sensor capabilities
- Perform studies to determine feasibility and establish sensor resource requirements for the architecture studies
- Formulation contracts placed with industry
  - Identify technology challenges
  - Evaluate requirements that can be met now and in the future
  - Identify risk reduction approach
  - ABI is currently under contract. Contract awards for other sensors are planned in 2003 and 2004
- Evaluate preliminary impacts to data flow and processing

Candidate Instruments

- ABI – Advanced Baseline Imager
  - 14 - 18 channels; rapid scan; 5 –15 min full-disk
- HES – Hyperspectral Environmental Suite
  - High spectral sounding capability plus improved imagery for coastal waters, open oceans and severe weather/mesoscale
- SEM – Space Environment Monitor
  - Magnetometer, Energetic Particle Sensors, X-ray Sensor, Extreme Ultraviolet Sensor (improved)
- SXI – Solar X-ray Imager
  - Improved dynamic range, sensitivity and resolution
- CSI – Coronagraph Solar Imager
- GLM – GOES Lightning Mapper
  - Lightning Sensor

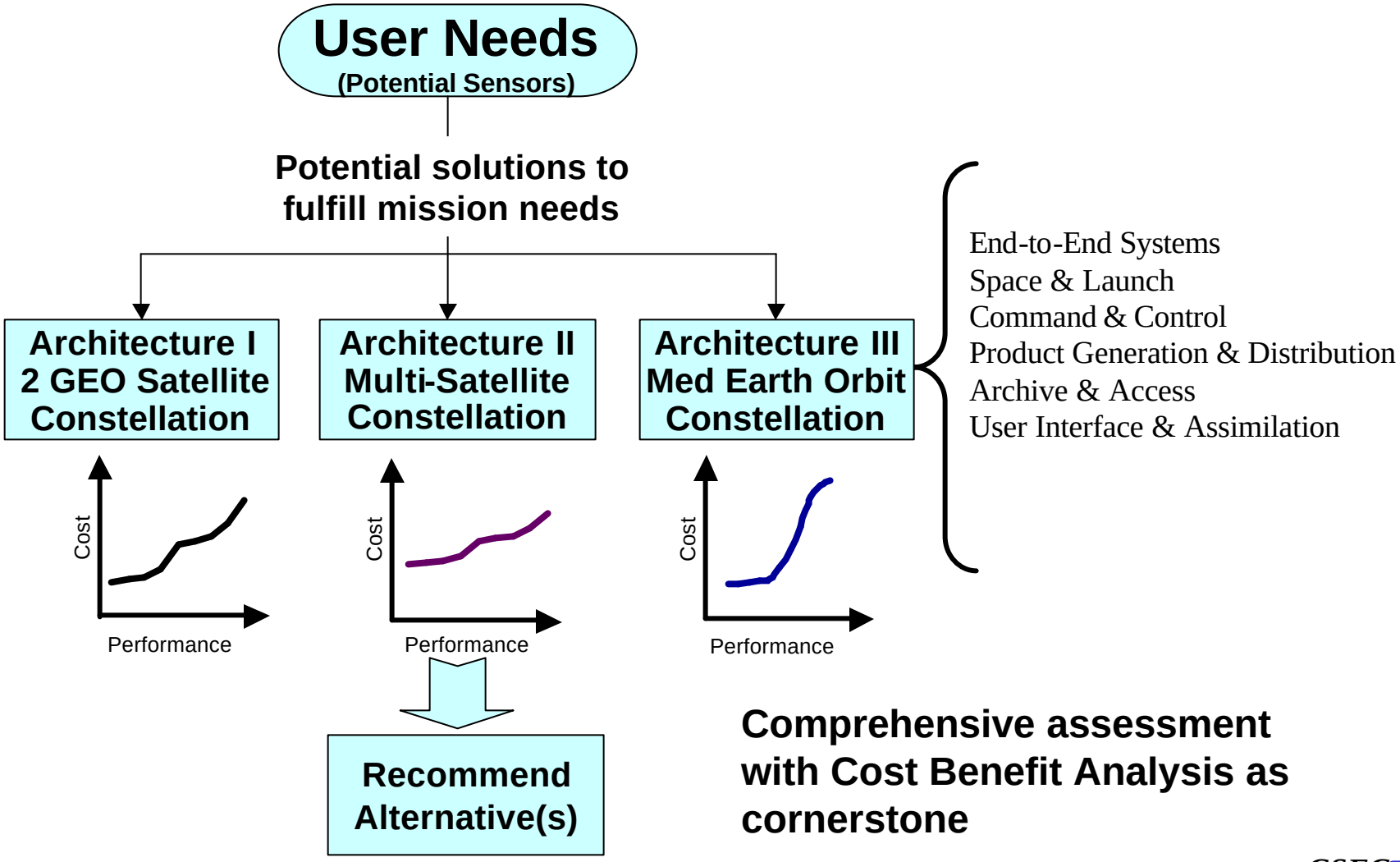
Other Candidate Instruments

- FDS- Full Disk Sounder
  - Rapid update for global and synoptic numerical weather prediction
- FDI – Full Disk Imager
  - Capture rapidly changing weather and diurnal climate patterns
- EHS – Emissive Hyperspectral Sensor
  - Mesoscale Severe Weather Imager
- RHS – Reflective Hyperspectral Sensor
  - Cloud, land and open ocean imaging
- GMS – GOES Microwave Suite
  - Limited passive microwave capability
- MFGS – Multi-Function GOES Sensor
  - Sounding and imaging

Purpose of the Architecture Studies

- Achieve as many of the user requirements as possible with acceptable risk
- Determine flexibility of various architectures to accommodate evolving user needs
  - GOES-R will be in service from 2012 – 2027 – we don't expect the configuration to be static
  - Technology will evolve and allow GOES to meet more of the users' needs
  - Users' needs will change
- Provide timely and reliable distribution of the data that can grow with the system
- Perform cost/benefits analysis
  - Help make informed decisions on the cost and risk of each requirement
  - Defend budget requests

Architecture Study Structure



End-to-End System Formulation

- Perform a sequence of studies, each involving a suite of instruments
  - Mixing and matching instruments will provide information to build comprehensive set of points (performance, risk, and cost)
- Each study includes an end-to-end systems design for the mission
- Each study is structured with a basic configuration and selected options
- Cost estimates developed for each configuration
- The aggregate of studies will provide significant data points along the continuum from minimal to maximal possible configurations and architectures envisioned for the GOES-R Series

Matrix of Configurations Studied

	MULTISAT							SINGLESAT			
	RUN 1		RUN 2		RUN 3			RUN 1	RUN 2	RUN 3	RUN 4
	"ABI" Sat	"HES" Sat	"FDS" + "EHS" Sat	"C" Sat	HES Sat	ABI Sat	ComSat Wing	Single Sat	Advanced Single Sat	Advanced Single Sat w/ CSI & SEI	"ABI" + "HES" Sat
ABI	X					X			X	X	X
NGI								X			
HES		X			X				X	X	X
NGS								X			
FDS			X								
EHS			X								
GMS				X							
SXI	X							X			X
CSI	X						X			X	X
ESI						X	X		X	X	
XRS / EUV							X	X	X	X	
SEM		X					X	X	X	X	X
MFS		X	X								X
GLM	X			X							
SEI						X				X	
GOES-R IOO					X			X	X	X	

2 Satellite GOES-R Architecture

West	East
Advanced Baseline Imager	Advanced Baseline Imager
Hyperspectral Environmental Suite	Hyperspectral Environmental Suite
Space Environment Monitor	Space Environment Monitor
Solar X-ray Imager	Solar X-ray Imager
Services	Services

Additional Instruments could be flown on existing or future satellites

- Microwave Sounder
- Lightning Mapper
- Coronagraph
- Multi-Function Sensor

Multi-Satellite GOES-R Architecture

West	East
Advanced Baseline Imager Solar X-ray Imager Services	Advanced Baseline Imager Solar X-ray Imager Services
Hyperspectral Environmental Suite Space Environment Monitor Multi-Function Sensor Services	Hyperspectral Environmental Suite Space Environment Monitor Multi-Function Sensor Services

Additional Instruments could be flown on existing or future satellites

- **Microwave Sounder**
- **Lightning Mapper**
- **Coronagraph**

Preliminary Results

- Both, 2 GOES Satellite (current architecture) and Multi-satellite architectures, will meet a large number of current and future user needs
- A Multi-satellite architecture can better meet user needs while providing:
  - Greater flexibility to fly more sensors
  - Flexibility to introduce new sensor technologies
  - An easier path to add additional sensors in the future

GOES R Baseline Architecture Planning Schedule

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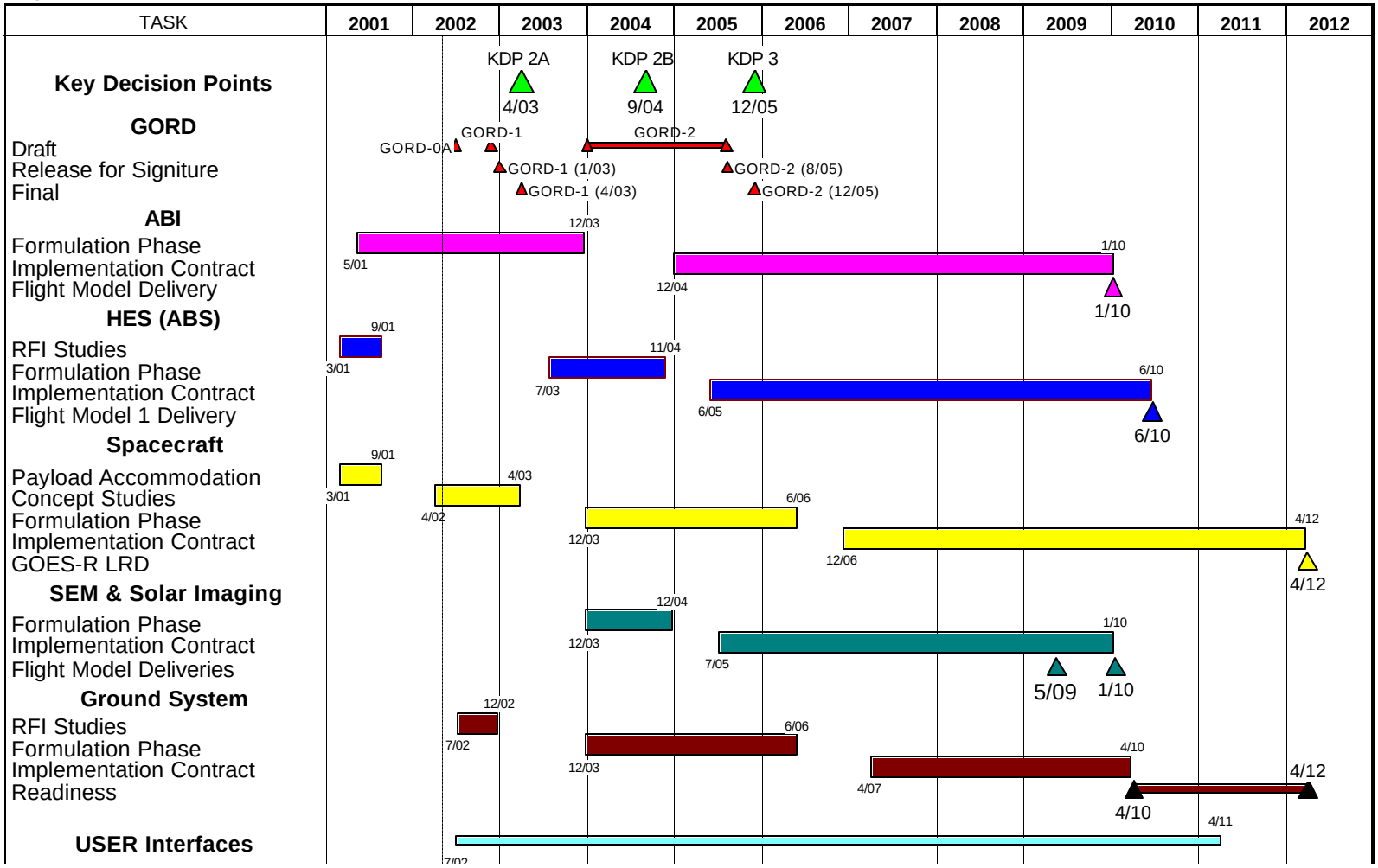

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GOES Coverage